

### REMARKS

Applicants appreciate the thorough examination of this application as evidenced by the Office Action, and appreciate the Examiner's indication that Claims 3-5, 9, 13, 17-19, 24-26, and 31 contain patentable subject matter and would be allowed if amended in independent form including all of the limitations of their base claim and any intervening claims.

Applicants have carefully examined the cited references, and have amended independent Claims 1, 10, 22, and 29 to clarify their distinctions over the cited references, and have canceled original independent Claim 21. Applicants submit that amended independent claims 1, 10, 22, and 29 are patentable over the cited references in view of the above amendments and for at least the reasons explained below.

#### Amended Claims 1, 10, 22, and 29:

Amended Claim 1 recites *inter alia*:

1. (Currently Amended) A carrier recovery apparatus for use in a high-definition TV receiver, comprising:

an error compensating unit that is configured to combine a complex input signal with a frequency signal to generate a complex output signal, wherein the complex output signal includes an error reference signal, wherein the error reference signal comprises at least one PN signal in a field synchronization signal of the complex input signal, and wherein the PN signal is one of a plurality of PN signals;

...

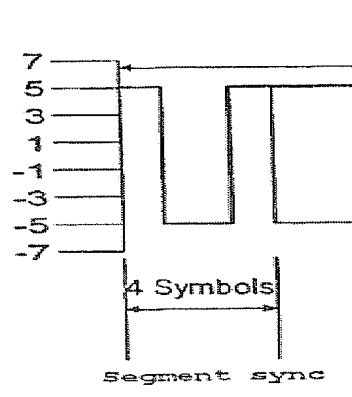
a first error detecting unit that is configured to receive the complex output signal from the second output path of the switching unit, and is configured to determine location of the PN signal of the error reference signal in the complex output signal based on a real part of the complex output signal, and is configured to generate the frequency signal based on the determined location of the PN signal of the error reference signal in the complex output signal.

Accordingly, Claim 1 has been amended to emphasize that the reference signal comprises at least one PN signal in a field synchronization signal of the complex input signal, and the first error detecting unit determines location of the PN signal of the error reference signal in the complex output signal based on a real part of the complex output signal, and generates the frequency signal based on the determined location of the PN signal of the error reference signal in the complex output signal. Independent Claims 10, 22, and 29 have been amended in a corresponding manner to Claim 1. Support for these amendments is provided, for example, on page 8, lines 6-31, of the present application specification.

Independent Claims 1 and 22 stand rejected under 35 U.S.C §103(a) as being unpatentable over US Patent Publ. No. 2001/0033625 to Ninomiya et al. (Ninomiya2) in view of US Patent No. 6,967,694 to Ninomiya et al. (Ninomiya1). Independent Claims 10 and 29 stand rejected under 35 U.S.C §103(a) as being unpatentable over Ninomiya1.

In sharp contrast to amended Claims 1, 10, 22, and 29, Ninomiya1's synchronous (sync) code pattern detector 101 of Fig.1 detects a sync pattern of four symbols in a segment sync signal, as illustrated in Fig. 6, below:

Portion of Ninomiya1 Figure 6



More particularly, Ninomiya1 describes in column 4, lines 39-59 the following (emphasis added):

In the sync pattern detecting circuit 101, the code bit (MSB) of all reception data is processed, and +, -, -, + as code pattern of segment sync signal are detected. When processing the signal by the complement of 2, the codes of the segment synchronous signal are -, +, +, -.

When processing the code bits only, even in the presence of strong ghost, multipath interference or NTSC same channel interference characteristic of digital terrestrial broadcast, the reception data receives considerably effects of impedance, and deterioration occurs, but the code bit information is extremely strong against effects of interference even in the inferior reception wave situation, so that the synchronous pattern of the segment sync signal can be detected stably.

When detecting the sync pattern for four symbols in all reception data in the sync pattern detecting circuit 101, simultaneously, signal sdet is issued to the detection protection counter 103 and segment sync detection establishing circuit 104. When counting 832 symbols in one packet, a signal Co is issued to the detection protection counter 103 and segment sync detection establishing circuit 104. (Ninomiya1, column 4, lines 39-59, emphasis added)

Accordingly, the sync pattern detecting circuit 101 of Ninomiya1 uses the "+, -, -, + code pattern of [the] segment sync signal" to become synchronized to the received signal.

Ninomiya1 does not describe or suggest an error detecting unit that determines location of a PN signal of an error reference signal in a complex output signal based on a real part of the complex output signal, and that generates a frequency signal based on the determined location of the PN signal of the error reference signal in the complex output signal.

Ninomiya2 is directed to a multi-system receiver that switches among different demodulation circuits in response to a pilot signal. Applicants have carefully examined Ninomiya2 and submit that Ninomiya2 also does not describe or suggest an error detecting unit that determines location of a PN signal of an error reference signal in a complex output signal based on a real part of the complex output signal, and that generates a frequency signal based on the determined location of the PN signal of the error reference signal in the complex output signal.

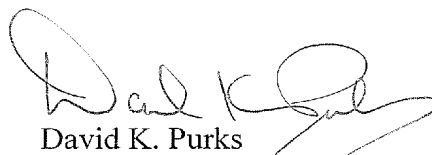
For at least these reasons, Applicants submit that amended independent Claims 1, 10, 22, and 29 are patentable over Ninomiya1 in view of Ninomiya2. Accordingly, Applicants request reconsideration and allowance of Claims 1, 10, 22, and 29.

### CONCLUSION

In view of the above amendments and remarks, Applicants submit that the application is in condition for allowance, which is respectfully requested in due course.

If, in the opinion of the Examiner, a telephonic conference would expedite the examination of this matter, the Examiner is invited to call the undersigned attorney at (919) 854-1400.

Respectfully submitted,



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